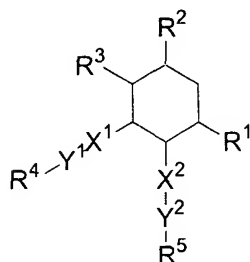


What is claimed is:

1. Compounds having the structure of (I), as well as pharmaceutically acceptable salts, prodrugs and solvates thereof:



(I)

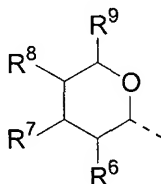
wherein,

R^1 and R^2 are independently amino, protected amino or modified amino,

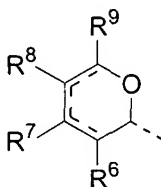
X^1 and X^2 are independently O, S or NH,

Y^1 or Y^2 is a bond or a divalent linking group,

R^3 is selected from the group consisting of the formula (II) or (III):

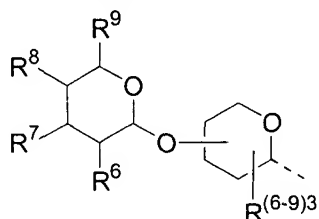


(II)

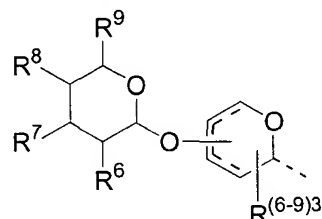


(III)

R^6 , R^7 , R^8 and R^9 can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R^6 , R^7 , R^8 and R^9 can be independently another mono- or
 5 disaccharide (II), including disaccharides (II-1) and (III-1).

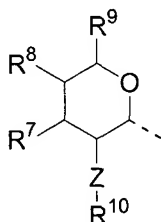


(II-1)

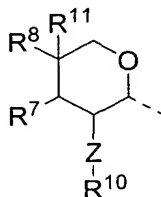


(III-1)

one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V), (VI) or (VII):

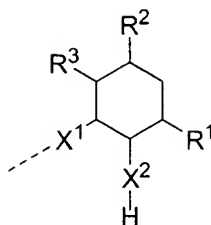


(IV)

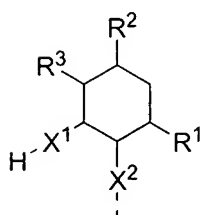


(V)

10



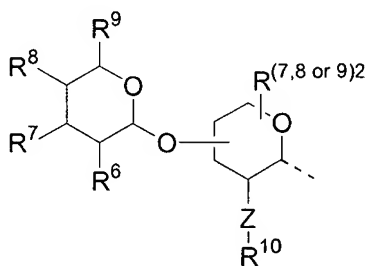
(VI)



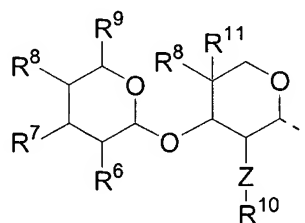
(VII)

Z can be O, S or NH,

- R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another monoe- or disaccharide (II), including disaccharides (IV-1) and (V-1)



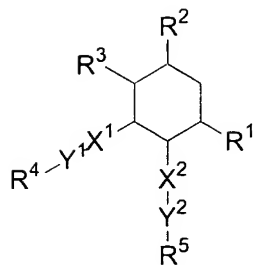
(IV-1)



(V-1)

- R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and R¹¹ can be a hydrogen, halogen or alkyl group.

2. A method for synthesizing compounds having the structure of (I), as well as pharmaceutically acceptable salts, prodrugs and solvates thereof:



(I)

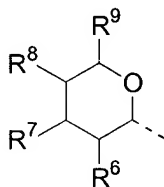
wherein,

R^1 and R^2 are independently amino, protected amino or modified amino,

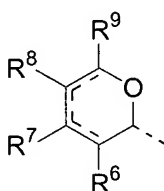
X^1 and X^2 are independently O, S or NH,

5 Y^1 or Y^2 is a bond or a divalent linking group,

R^3 is selected from the group consisting of the formula (II) or (III):



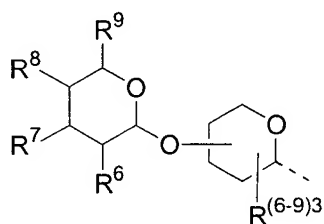
(II)



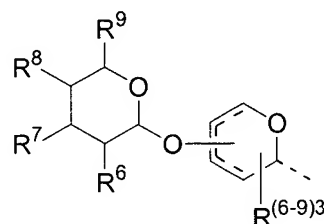
(III)

10 R^6 , R^7 , R^8 and R^9 can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl,

keto or a halogen or R^6 , R^7 , R^8 and R^9 can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

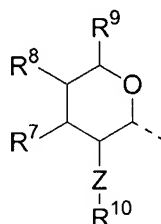


(II-1)

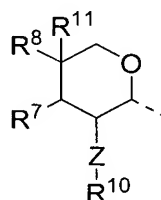


(III-1)

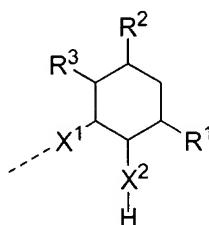
- one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V), (VI) or (VII):



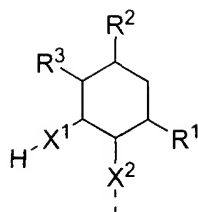
(IV)



(V)



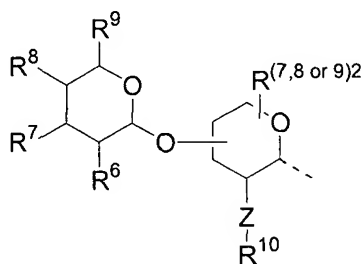
(VI)



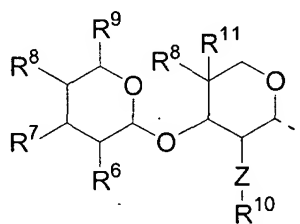
(VII)

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,
 5 hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)



(IV-1)



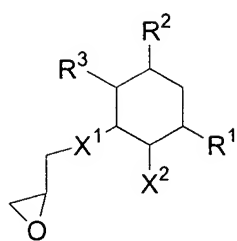
(V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified
 10 amino, hydroxyl protecting or modified hydroxyl group, and

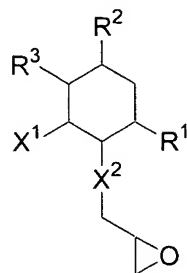
R¹¹ can be a hydrogen, halogen or alkyl group.

3. Compounds having the structure of (Ia), (Ib), (Ic), (Id), (IIa), (IIIa), (IVa) or
 (Va):

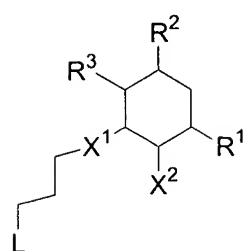
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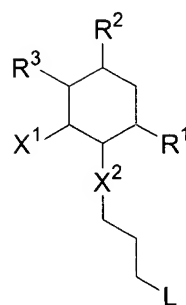
(Ia)



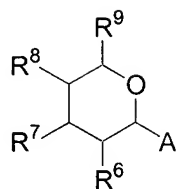
(Ic)



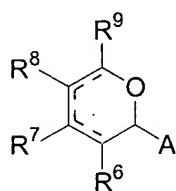
(Ib)



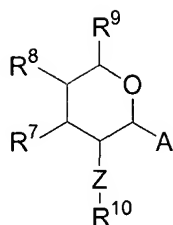
(Id)



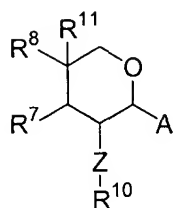
(IIa)



(IIIa)



(IVa)



(Va)

wherein, L is a leaving group,

5 A is a carbohydrate-activating group,

R¹ and R² are independently amino, protected amino or modified amino,

R³ is selected from the group consisting of the formula (II) or (III),

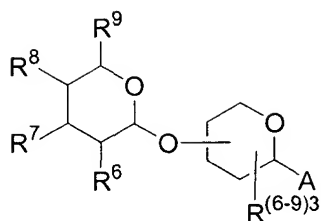
R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

10 hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen.

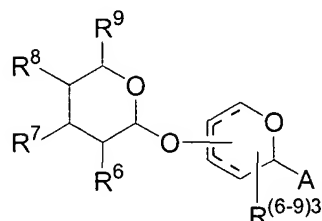
R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl,

15 keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IIa-1) and (IIIa-1).

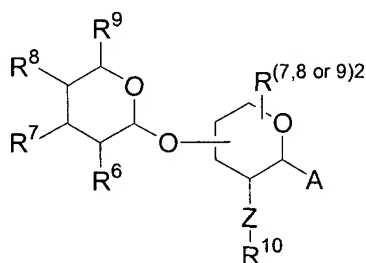


(IIa-1)

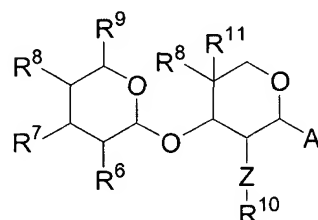


(IIIa-1)

R^7 , R^8 and R^9 can also be independently another mono- or disaccharide (II), including disaccharides (IVa-1) and (Va-1)



(IVa-1)



(Va-1)

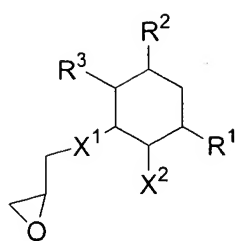
5 One of X^1 or X^2 is O, the other can be a protected hydroxyl or modified hydroxyl,

Z can be O, S or NH,

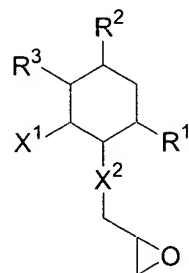
R^{10} can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and

10 R^{11} can be a hydrogen, halogen or alkyl group.

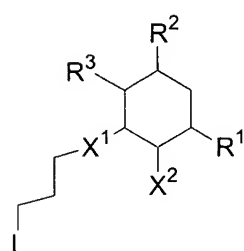
4. A method for synthesizing compounds having the structure of (Ia), (Ib), (Ic), (Id), (IIa), (IIIa), (IVa) or (Va):



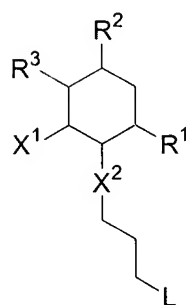
(Ia)



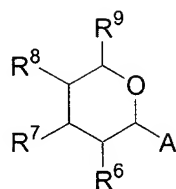
(Ic)



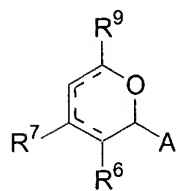
(Ib)



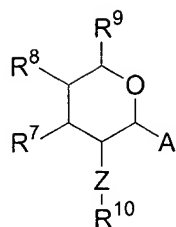
(Id)



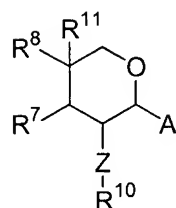
(IIa)



(IIIa)



(IVa)



(Va)

wherein, L is a leaving group,

5 A is a carbohydrate-activating group,

R^1 and R^2 are independently amino, protected amino or modified amino,

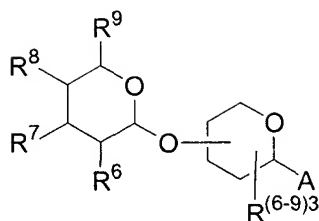
R^3 is selected from the group consisting of the formula (II) or (III),

R^6 , R^7 , R^8 and R^9 can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

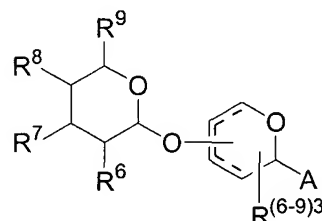
10 hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen,

R^6 , R^7 , R^8 and R^9 can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R^6 , R^7 , R^8 and R^9 can be independently another mono- or

15 disaccharide (II), including disaccharides (IIa-1) and (IIIa-1).

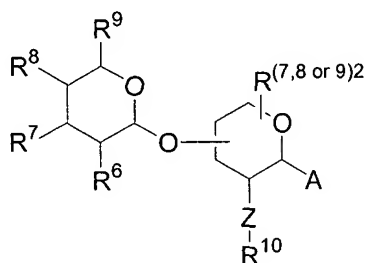


(IIa-1)

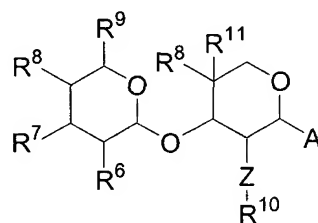


(IIIa-1)

R^7 , R^8 and R^9 can also be independently another mono- or disaccharide (II), including disaccharides (IVa-1) and (Va-1)



(IVa-1)



(Va-1)

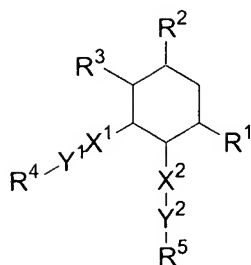
5 One of X^1 or X^2 is O, the other can be a protected hydroxyl or modified hydroxyl,

Z can be O, S or NH,

R^{10} can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and

10 R^{11} can be a hydrogen, halogen or alkyl group.

5. A pharmaceutical composition for the prophylaxis, amelioration or treatment of a bacterial infection, viral infection, a cancer, or a genetic disorder in mammals avian, fish and reptile species as well as in cell culture, which comprises
15 a therapeutically effective amount of a compound of formula I or a pharmaceutically acceptable salt, prodrug or solvate thereof,



(I)

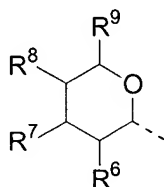
wherein,

R^1 and R^2 are independently amino, protected amino or modified amino,

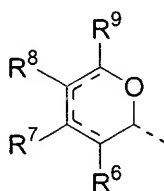
X^1 and X^2 are independently O, S or NH,

5 Y^1 or Y^2 is a bond or a divalent linking group,

R^3 is selected from the group consisting of the formula (II) or (III):

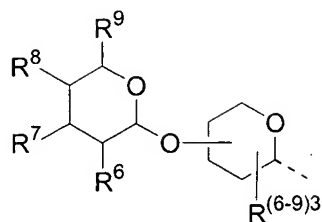


(II)

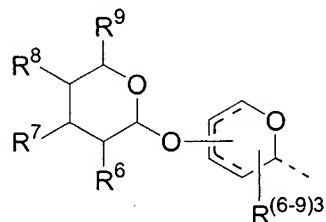


(III)

10 R^6 , R^7 , R^8 and R^9 can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R^6 , R^7 , R^8 and R^9 can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

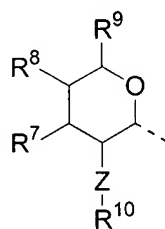


(II-1)

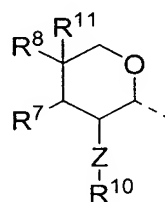


(III-1)

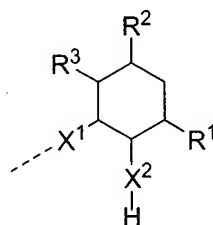
one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group
 5 consisting of formula (II), (III), (IV), (V) or (VI):



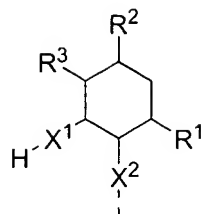
(IV)



(V)



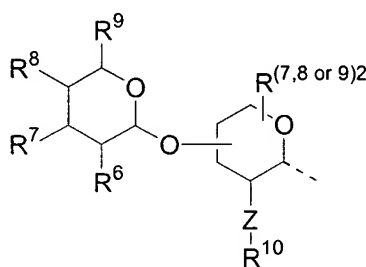
(VI)



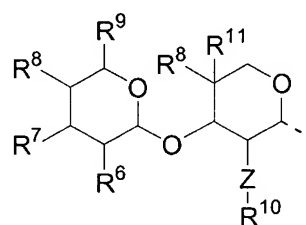
(VII)

Z can be O, S or NH,

- R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)



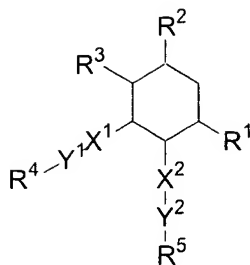
(IV-1)



(V-1)

- R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, R¹¹ can be a hydrogen, halogen or alkyl group, and a pharmaceutically acceptable carrier.

6. A method for treating, preventing, or ameliorating a bacterial infection, a viral infection, a cancer, or a genetic disorder in mammals, avian, fish and reptile species as well as in cell culture, which comprises administering a therapeutically effective amount of a compound of formula I or a pharmaceutically acceptable salt, prodrug or solvate thereof,



(I)

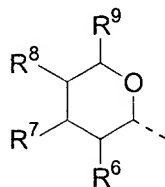
wherein,

R^1 and R^2 are independently amino, protected amino or modified amino,

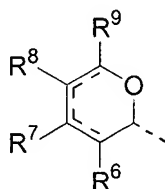
X^1 and X^2 are independently O, S or NH,

5 Y^1 or Y^2 is a bond or a divalent linking group,

R^3 is selected from the group consisting of the formula (II) or (III):

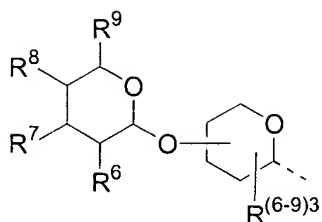


(II)

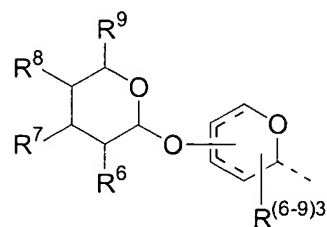


(III)

10 R^6 , R^7 , R^8 and R^9 can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R^6 , R^7 , R^8 and R^9 can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

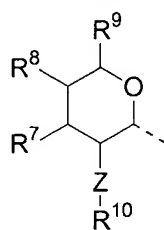


(II-1)

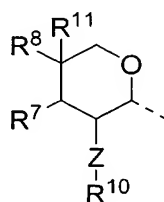


(III-1)

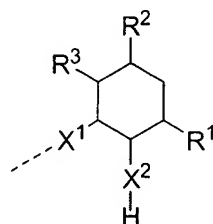
one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V) or (VI):



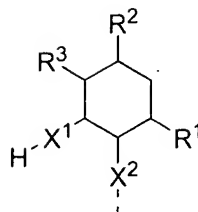
(IV)



(V)



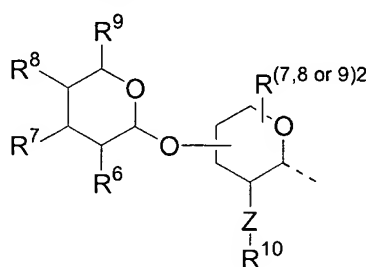
(VI)



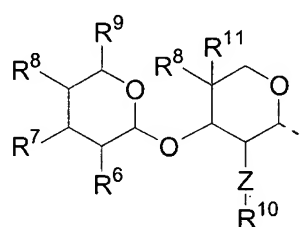
(VII)

Z can be O, S or NH,

- R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)



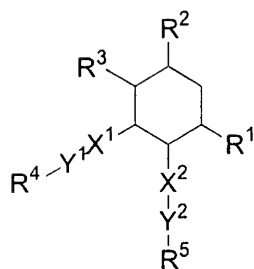
(IV-1)



(V-1)

- R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, R¹¹ can be a hydrogen, halogen or alkyl group, and a pharmaceutically acceptable carrier.

7. An antibacterial, antiviral or antifungal agent comprising a compound of formula I,



(I)

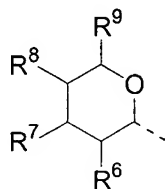
wherein,

R^1 and R^2 are independently amino, protected amino or modified amino,

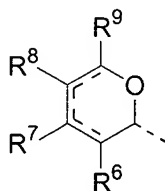
X^1 and X^2 are independently O, S or NH,

5 Y^1 or Y^2 is a bond or a divalent linking group,

R^3 is selected from the group consisting of the formula (II) or (III):

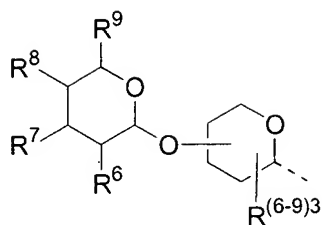


(II)

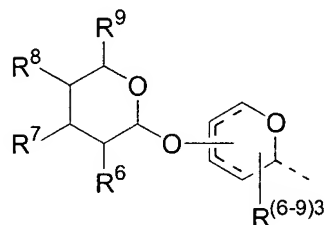


(III)

10 R^6 , R^7 , R^8 and R^9 can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R^6 , R^7 , R^8 and R^9 can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

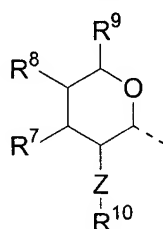


(II-1)

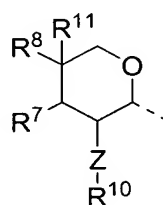


(III-1)

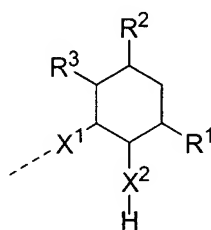
one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V) or (VI):



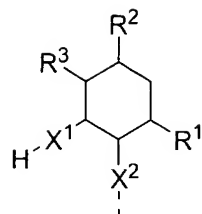
(IV)



(V)



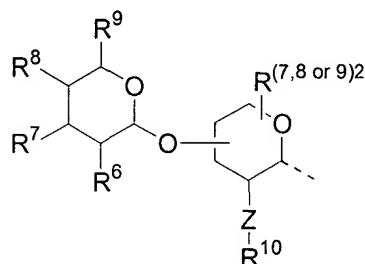
(VI)



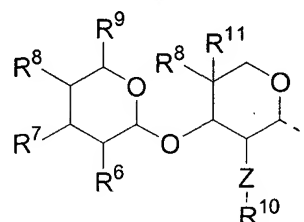
(VII)

Z can be O, S or NH,

- 5 R^7 , R^8 and R^9 can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R^7 , R^8 and R^9 can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)



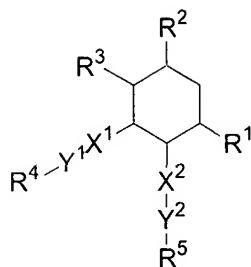
(IV-1)



(V-1)

- 10 R^{10} can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group,
 R^{11} can be a hydrogen, halogen or alkyl group,
 and an acceptable carrier.

- 15 8. A method for preventing, inhibiting, or stopping the growth of bacteria on a surface or within the material of the surface or within the material of the surface, comprising applying to a surface or within the material of the surface an effective amount of an antibacterial agent comprising a compound of formula I, and an acceptable carrier.



(I)

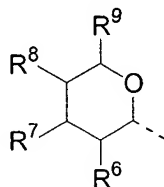
wherein,

R^1 and R^2 are independently amino, protected amino or modified amino,

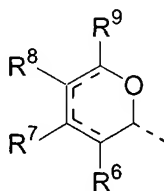
X^1 and X^2 are independently O, S or NH,

5 Y^1 or Y^2 is a bond or a divalent linking group,

R^3 is selected from the group consisting of the formula (II) or (III):

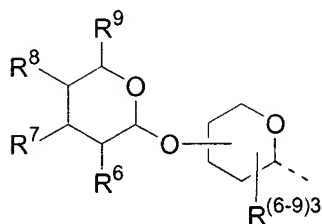


(II)

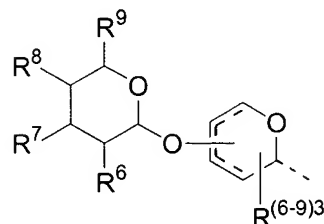


(III)

R^6 , R^7 , R^8 and R^9 can be independently a hydrogen, hydroxyl, protected
 10 hydroxyl, modified hydroxyl, amino, protected amino, modified amino,
 hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl,
 keto or a halogen or R^6 , R^7 , R^8 and R^9 can be independently another mono- or
 disaccharide (II), including disaccharides (II-1) and (III-1).

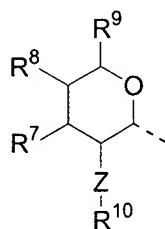


(II-1)

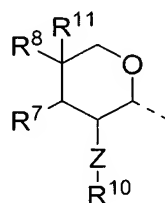


(III-1)

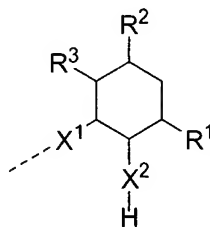
- one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group
- 5 consisting of formula (II), (III), (IV), (V) or (VI):



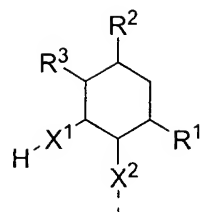
(IV)



(V)



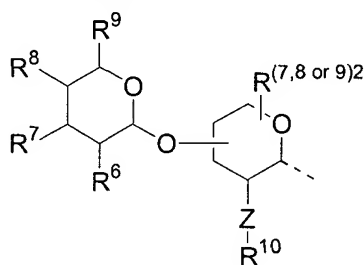
(VI)



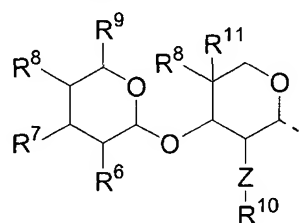
(VII)

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,
 5 hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)



(IV-1)



(V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified
 10 amino, hydroxyl protecting or modified hydroxyl group, and
 R¹¹ can be a hydrogen, halogen or alkyl group.